10/20/16 "One finds limits by pushing them." -Herbert Simon

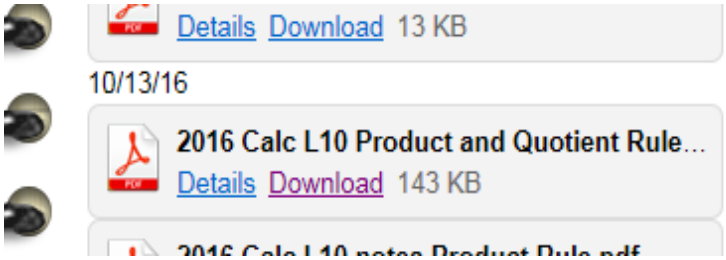
HW: "Quotient Rule HW" #5-8, 14, 18

Test 3 on Friday 11/4

AIM: What is the Quotient Rule for Derivatives?

Warm Up:

HW Sheet:



2. The Quotient Rule:

If a function is the quotient of two differentiable functions then the derivative is "the **denominator times the derivative of the numerator minus the numerator times the derivative of the denominator, all divided by the denominator, squared.**

$$\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$$

Hi

Low

Low di Hi - Hi di Low

Low Low

EX #3: Find y' given $y = \dfrac{3x+7}{x^2-1}$ (Hi / Low)

$$y' = \frac{\overset{\text{Low}}{(x^2-1)}\overset{\text{dHi}}{(3)} - \overset{\text{Hi}}{(3x+7)}\overset{\text{dLow}}{(2x)}}{\underset{\text{Low Low}}{(x^2-1)^2}}$$

EX #4: Differentiate and simplify.

$$g(x) = \frac{2x^3 + 4x^2 - 7}{x - 5}$$

$$g'(x) = \frac{(x-5)(6x^2+8x) - (2x^3+4x^2-7)(1)}{(x-5)^2}$$

$$g'(x) = \frac{6x^3 + 8x^2 - 30x^2 - 40x - 2x^3 - 4x^2 + 7}{x^2 - 10x + 25}$$

$$g'(x) = \frac{4x^3 - 26x^2 - 40x + 7}{x^2 - 10x + 25}$$

EX #5: Find an equation of the tangent line to the graph of *f* at the point $(-5,5)$

$$f(x)=\frac{x}{x+4}$$

need slope

$$f'(x)=\frac{(x+4)(1)-x(1)}{(x+4)^2}=\frac{x+4-x}{(x+4)^2}=\frac{4}{(x+4)^2}$$

$$f'(-5)=\frac{4}{(-5+4)^2}=4$$

$m_{tangent}=4$

$$y-5=4(x+5)$$

EX #6: Using the Constant Multiple Rule to Rewrite

Function	Rewrite	Differentiate	Simplify
$y = \frac{x^2 - 4x}{8}$	$= \frac{1}{8}x^2 - \frac{4}{8}x$	$y' = \frac{2}{8}x - \frac{4}{8} =$	$\frac{2x-4}{8}$
$y = \frac{3x^3}{5}$		$y' = \frac{8(2x-4) - (x^2-4x)(0)}{8^2} =$	$\frac{2x-4}{8}$
$y = \frac{6x^{\frac{5}{2}}}{x}$			
$y = \frac{6x^4 + x^3 - 2x}{\sqrt{x}}$			